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Department of Chemistry, D. S. SANKHLA.  
University of Jodhpur, R. C. MATHUR.\*  
Jodhpur 342 001, India, SUDHINDRA N. MISRA.\*\*  
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\* Camouflage Division, Defence Laboratory, Jodhpur.

\*\* For correspondence.

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### VARIATION IN MAJOR LIPID COMPONENTS IN THE INTESTINE OF *ANTHERAEA MYLITTA* DURING LARVAL DEVELOPMENT AND SPINNING PERIOD

#### Introduction

In insects, haemolymph is the link between intestine and the fat body, the major site for storage of lipids, the composition whereof resembles that of dietary lipids<sup>1</sup>. Hence the analysis of intestinal lipids was considered pertinent to provide information regarding their digestion, absorption and resynthesis in the intestine and their transport to other tissues. The study was also anticipated to throw light on the utilization of lipids as a potential energy source for maintenance of the structural and physiological integrity of cellular organelles.

#### Materials and Methods

Larvae of *A. mylitta* were procured from Tasar Field Research Station, Jagadapur (M.P.). Larvae were dissected and lipids extracted and fractionated as described earlier<sup>2,3</sup>.

All assays were carried out in duplicates in three separate pools of intestines from 10 insects each, as well as from a grand pool of the three pools and average values were employed for calculations.

#### Results and Discussion

In *A. mylitta* larva, intestinal (Table I) total lipids (TL) vary between 15.3-16.9, 16.9-24.0 and 11.4-

23.1% respectively during 3rd, 4th and 5th instar stages. This indicates that the intestinal lipids are of dietary origin and their significant fluctuations observed, during development in the intestine itself, is suggestive of the transport of dietary lipids to the storage site, the fat body. This is substantiated by the concurrent increase in the fat body lipid and the maintenance of very low level thereof, in the haemolymph during fifth instar<sup>4,5</sup>.

Neutral lipids (NL) vary more or less in the same manner as the total lipids (TL) and constitute the major lipid fraction all through larval development and spinning period except at 48 h. This suggests their role as the main energy supplier<sup>6</sup> during period of high energy requirement like growth, development and silk synthesis. Reciprocal relationship between NL and free fatty acids (FFA) as observed during 3rd instar stage is indicative of the interconversion of the two (NL and FFA) when the *de novo* synthesized FFA get incorporated into the triglyceride reserve<sup>7</sup>. The high level of NL could also be attributed to its synthesis from non-lipoidal substrate<sup>8</sup>.

While in *Melanoplus*, only 30% of FFA exists as NL and the remaining 70% as FFA<sup>2</sup>, in *A. mylitta* the former (FFA) stands at a lower concentration than either NL or phospholipids (PL) during larval development till 24 h to the commencement of spinning. It is noteworthy that during spinning, except at 48 h PL and NL reveal a decreasing trend, while FFA do not depict any significant variation. This is suggestive of the conversion of NL to FFA earmarked for utilization during pupal development and for high energy demanding processes.

The proportion of PL in the insects, although is usually low in comparison in some insect tissues (intestine and wing buds), sometimes even as high as 50% of TL has been reported<sup>9</sup>. Kulkarni *et al.*<sup>10</sup> based on similar observations in *Mimodesma sexta* termed this as one of the biochemical characteristics of lepidopteran larva. The same appears to hold good for *A. mylitta* in the present investigation.

PL in the 3rd instar larva depicts initially a steady increase followed by a decline (Table I). The initial accumulation of about 38.8% (day 3) indicates that the PL are of dietary origin since TL, NL and FFA do not show regular decline during the same period.

Intestine of 4th instar larva accumulates 8.1% (Table I) of PL on day 3 with simultaneous sharp decline in other components. This is indicative of the synthesis of PL from other components.

On the eve of spinning, the intestine does not reveal variation in TL concentration, suggesting the storage of lipids for utilization during silk synthesis and prepupal development. At the same time PL depicts a declining trend till 48 h prior to the spinning period while the position is reverse for other compo-

TABLE I

Variation in major lipid components in the intestine of *A. mylitta* during larval development and spinning period  
(Expressed in g/100 g dry wt. tissue)

Instar	Age of larva in days	Total lipids (TL)	Neutral lipids (NL)	Free fatty acids (FFA)	Phospho-lipids (PL)
III	1	15.3 ± 1.0	10.4 ± 0.7	1.5 ± 0.1	2.7 ± 0.1
	2	16.6 ± 1.1	8.6 ± 0.8	1.9 ± 0.1	5.8 ± 0.3
	3	18.3 ± 1.1	9.9 ± 0.9	1.0 ± 0.1	7.1 ± 0.3
	4	22.1 ± 1.7	10.4 ± 0.8	0.8 ± 0.0	6.3 ± 0.0
IV	1	..	..	..	..
	2	24.0 ± 1.6	12.7 ± 0.8	1.5 ± 0.1	6.3 ± 0.4
	3	17.3 ± 0.9	6.5 ± 0.4	0.6 ± 0.0	8.1 ± 0.2
	4	16.9 ± 1.6	7.8 ± 0.3	0.7 ± 0.0	7.9 ± 0.3
	5	18.2 ± 1.4	9.9 ± 0.5	0.6 ± 0.0	4.9 ± 0.1
V	1	..	..	..	..
	2	23.1 ± 1.8	10.1 ± 0.7	1.5 ± 0.1	10.7 ± 0.8
	3	13.1 ± 0.8	5.1 ± 0.3	1.3 ± 0.1	4.2 ± 0.1
	4	11.4 ± 0.8	4.2 ± 0.2	2.0 ± 0.1	4.1 ± 0.1
	5	12.0 ± 0.9	6.0 ± 0.3	0.6 ± 0.0	4.4 ± 0.2
	6	15.9 ± 2.4	7.6 ± 0.3	0.6 ± 0.0	5.8 ± 0.3
	*E <sub>1</sub>	18.4 ± 0.8	6.2 ± 0.3	0.7 ± 0.0	4.8 ± 0.2
	*E <sub>2</sub>	18.4 ± 0.8	8.5 ± 0.7	0.5 ± 0.0	4.5 ± 0.2
Spinning hours	0	12.3 ± 0.9	7.0 ± 0.4	1.9 ± 0.1	3.4 ± 1.0
	24	7.7 ± 0.3	3.9 ± 0.3	1.0 ± 0.1	2.6 ± 0.1
	48	7.0 ± 0.3	1.1 ± 0.8	2.0 ± 0.1	3.3 ± 0.1
	72	4.9 ± 0.3	1.6 ± 0.9	2.2 ± 0.1	0.9 ± 0.0

\* F<sub>1</sub> 48 and E<sub>2</sub> 24 h prior to the commencement of silk spinning period.

nents indicating the interrelationship between the lipid fractions, viz., PL, FFA and NL.

During spinning period high concentrations of PL of feeding larva decline to negligible quantity when larva stops feeding.

Occurrence of PL in high concentrations during larval period could be attributed to its importance in many vital functions<sup>11,12</sup> since degeneration of intestinal tissue with vigorous decline in all the lipid components particularly PL has been observed during silk spinning period.

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Department of Biochemistry,  
University of Allahabad,  
Allahabad, India, December 7, 1978.

RADHA PANT,  
GIRISH KUMAR SRIVASTAVA.

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